

# Invasive group A streptococcal disease

## NSW Control Guidelines for Public Health Units



### Revision history

Version	Date	Revised by	Changes
1.0	16 September 2016	Communicable Diseases Branch	Development of the guideline
2.0	29 July 2022	Communicable Diseases Branch	Updated to reflect iGAS becoming a notifiable condition in NSW and align with current clinical guidance

## 1. Summary

### Public health priority

Urgent for maternal or neonatal sepsis or outbreaks. Routine for other notifications.

### PHU response time

Enter confirmed cases on NCIMS within 5 working days. Respond to outbreaks or cases of maternal or neonatal sepsis within 1 day.

### Case management

Isolate case and practise standard and droplet precautions for 24 hours after initiation of appropriate antibiotic treatment.

### Contact management

Antibiotic prophylaxis is recommended for maternal-neonate pairs, where either the mother or neonate develops invasive group A streptococcal disease (iGAS) during the first 28 days after birth. Routine screening and chemoprophylaxis are not recommended for other household or household-like contacts (except in the event of clusters or outbreaks).

## 2. The disease

### Infectious agent

Group A *Streptococcus* (Strep A) - a gram positive  $\beta$ -haemolytic coccus.[1]

### Reservoir

Humans.[1]

### Mode of transmission

Strep A is primarily transmitted person to person by respiratory droplets or by direct contact with symptomatic or asymptomatic people.[1]

### Incubation period

The incubation period for iGAS is not well defined. Based on evidence from the identification of secondary cases, it is usually 1-3 days but secondary cases have occurred up to 30 days after the identification of the primary case.[2-4]

### Infectious period

Cases are infectious from the onset of symptoms until 24 hours after initiation of appropriate antibiotic treatment.[1]

### Clinical presentation and outcome

Strep A infection causes a wide variety of disease ranging from uncomplicated skin and pharyngeal infections, and scarlet fever, to life-threatening invasive disease. Five to thirty percent of the community may carry the organism without it causing disease (asymptomatic carriage), usually on the skin or in the throat.[5]

Occasionally Group A Strep infection can lead to serious non-suppurative complications such as **acute rheumatic fever** and acute post-streptococcal glomerulonephritis.

iGAS is defined as Strep A infection in a normally sterile site, including blood, meninges, articular (joint) spaces, pericardium, peritoneum, pleural cavity, and bone. iGAS is also an important cause of severe **maternal sepsis**. Maternal sepsis can occur antenatally; however, most morbidity and mortality occur in the postpartum period (when it is known as **puerperal sepsis**).

Other severe manifestations of Strep A infection that may involve infection of a sterile site are:

- **Group A streptococcal toxic shock syndrome (STSS)** - infection associated with shock and multi-organ failure
- **Necrotising fasciitis** - an extensive necrosis of subcutaneous tissue

In Australia, mortality associated with iGAS has been reported as up to 23% when complicated by STSS.[6] In one report from the UK, 20% of patients with iGAS were admitted to an intensive care unit and a quarter required surgical intervention.[7]

## Persons at increased risk of disease

The elderly, Aboriginal and/or Torres Strait Islander Australians, people with chronic diseases (such as diabetes), immunosuppression (such as those in receipt of chemotherapy, high-dose steroids), and people who inject drugs are all at higher risk of iGAS.[8, 9]

Surgical, obstetric, and burns patients are particularly vulnerable to infection; broken cutaneous or mucosal barriers may facilitate invasive infection after exposure.[5] Acute viral respiratory infections, such as influenza, are risk factors for developing iGAS, and in children, 14-16% of cases have had recent varicella infection.[10]

Household contacts of iGAS cases have an increased risk of iGAS. Studies have estimated the attack rate to be more than 2000 per 100,000 people with the risk higher in mothers and babies in the neonatal period and couples aged over 75 years. A study of 24 clusters in England found more than half the secondary cases occurred within the first three days following the identification of the primary case.[3] Secondary cases usually occur in the first month. Outbreaks have also been reported in residential care facilities, hospitals, and childcare settings.[2-4, 10, 11]

The importance of crowded living conditions to facilitate Strep A transmission has been well documented; e.g. the risk of Strep A pharyngeal infection has been shown to be inversely proportional to the distance between a subject's bed and that of a colonised or infected case.[12] Poor skin health and household crowding is thought to contribute to the overall burden of Strep A infection and carriage.[13, 14]

## Disease occurrence and public health significance

Like other Strep A sequelae, iGAS incidence is higher in low resource settings. World-wide, it is estimated that more than 95% of the iGAS disease burden is in low resource countries.[15]

Reported incidence rates of iGAS in high resource countries are between 2 and 4 per 100,000 population per year.[11] Since the 1980s, iGAS transmission has been characterised by periodic increases in incidence, including in Australia where an increase in cases was reported in multiple jurisdictions.[10, 11, 16, 17] In the UK and Canada, notifications of iGAS peaked in 2017-2018.[18, 19] The highest rates of disease occur in infants and young children and the elderly.[6, 7, 11]

In NSW, hospitalisation data for iGAS bacteraemia for the period 2010 to 2020 followed a similar trend, peaking at 4.0 admissions per 100,000 population in 2017. Hospitalised iGAS bacteraemia cases are not evenly distributed across the state with higher rates in people in northern and western NSW.[Unpublished data] First Nations peoples in many high resource countries are also disproportionately affected, including Aboriginal and Torres Strait Islander people in Australia and Māori and Pasifika people in New Zealand.[20-22] In northern Australia and Queensland, iGAS incidence has been reported as 10 times higher in Aboriginal and Torres Strait Islander people than non-Indigenous people.[23-25] In NSW, the rate of hospitalisation from iGAS in Aboriginal and Torres Strait Islander people is double the rate in non-Aboriginal and Torres Strait Islander people. [Unpublished data]

Surface M protein (emm gene) confers resistance to phagocytosis and is a major determinant of virulence and the ability to cause invasive disease. There are currently more than 240 emm types described globally. Serotypes M1, M3, M12 and M28 are associated with iGAS. The highest mortality risk is associated with infection with the M1 and M3 serotypes.[1] Periodic increases in iGAS have been attributed to the circulation of highly virulent Strep A M types.[26, 27]

## 3. Routine prevention activities

The main aims of public health measures for iGAS are:

- to provide information to contacts on iGAS symptoms and the action they should take if they occur
- to identify and provide clearance antibiotics to maternal-neonate pairs, where either the mother or neonate develops iGAS during the first 28 days after birth
- to identify and manage iGAS outbreaks (refer to section 12 Special situations)
- manage primordial and primary risk factors for Strep A infection in high-risk populations and communities.

### Risk mitigation

Prevention of Strep A and associated conditions (including ARF/RHD and iGAS) is focused on primordial and primary prevention. Primordial prevention aims to reduce the levels of Strep A circulating at a population level through improving the social determinants of health (e.g. reducing household crowding, improved housing). Primary prevention is focused on the early detection and treatment of Strep A infections (e.g. skin and throat infection).

Strategies to reduce the risk of iGAS should focus on reducing the community burden of Strep A in the community through primordial and primary prevention measures. These activities should build on existing programs aimed at reducing rates of infectious disease amongst Aboriginal people.

#### *Primordial prevention activities*

Suggested activities to reduce overcrowding and improve the condition of housing in communities at higher risk include:

- Providing education to housing providers and funding agencies about the importance of limiting overcrowding. This should include consideration of the thermal regulation of housing stock to prevent families unnecessarily crowding together overnight during periods of extreme weather.
- Providing education to housing providers and funding agencies about the importance of ensuring houses have facilities with appropriate health hardware. For the reduction of Strep A infections, this should be centred around improvements that enable people to wash themselves and their clothing.
- Developing or engaging with programs that directly improve the condition of housing stock, such as [Housing for Health](#).
- Developing programs to provide products, such as soap, towels, bedding and washing lines, aimed at improving skin health in communities at higher risk.

#### *Primary prevention activities*

Suggested activities to reduce skin sores and sore throats in Aboriginal people include:

- Collaborative projects involving key Aboriginal community stakeholders to develop and provide culturally appropriate hygiene messaging to communities at higher risk.[28]

- Working with primary care clinicians to improve the management of Strep A pharyngitis in people at higher risk according to [Sore Throat Clinical Practice Guidelines](#).
- Working with primary care clinicians to improve the management skin infections in people at higher risk according to the [National Healthy Skin Guideline](#).
- Providing education programs to schools and childcare centres, like the existing [Mr Germ Hygiene and Food Safety Programs](#).
- Health and hygiene messaging can also be included in other related programs, such as animal management programs.

## Vaccination

There is currently no vaccine available for Strep A infection.

## 4. Surveillance objectives

- Identify clusters and/or outbreaks of iGAS and higher risk contacts requiring clearance antibiotics.
- Monitor and regularly report the epidemiology of iGAS in NSW.

## 5. Data management

Confirmed cases of iGAS should be entered on to NCIMS within five days of notification. Aboriginal or Torres Strait Islander status is to be completed, and symptoms of illness field if possible.

## 6. Communications

Laboratories are required to notify confirmed cases via electronic laboratory notification (eLR) or to the public health unit (PHU). The notification should include the case's age, sex, address, contact details (where available), date of specimen collection, clinical status and laboratory findings where available.

Public health units should notify the Communicable Diseases Branch about cases in mothers and babies in the neonatal period, household clusters and institutional outbreaks.

Offer of referral for cultural support for cases and families that identify as Aboriginal and/or Torres Strait Islander is strongly recommended (e.g. to hospital Aboriginal Liaison Officer, local Aboriginal Health Service - depending on local services available).

## 7. Case definition

Confirmed cases of iGAS are notifiable.

### Confirmed cases

A confirmed case requires **laboratory definitive evidence** only.

#### *Laboratory definitive evidence*

1. Isolation of group A *Streptococci* (*Streptococcus pyogenes*) by culture from a normally sterile site, including deep wound, deep tissue or surgical specimens.

OR

2. Detection of group A *Streptococci* (*Streptococcus pyogenes*) by nucleic acid testing from a normally sterile site, including deep wound, deep tissue or surgical specimens.

## 8. Laboratory testing

### Testing guidelines

The treating doctor should arrange the collection of a blood and/or a specimen from a relevant sterile site for culture or nucleic acid amplification testing, if a patient:

- meets the [Clinical Excellence Commission criteria for blood culture](#)
- has another presentation that suggests possible infection with *S. pyogenes*, or
- is a contact of an iGAS case and has developed iGAS symptoms [2].

The sample should be taken as soon as possible, and preferably before antibiotics are administered. Culture or nucleic acid detection of *S. pyogenes* from blood, CSF or other normally sterile site confirms a diagnosis of iGAS.

In the case of household or household-like clusters or suspected institutional outbreaks, specimens should be referred to ICPMR for molecular typing.

## 9. Case management

### Response times

Enter confirmed cases on NCIMS within 5 working days. Respond to cases of maternal or neonatal sepsis or suspected outbreaks within 1 day.

### Response procedure

#### *Investigation*

- Confirm the results of relevant pathology tests.
- Confirm the case meets the criteria for invasive disease.
- Complete the Aboriginal and/or Torres Strait Islander field.
- Complete symptoms of illness field if available.
- Determine if the case is part of a neonate-maternal pair, or institutional or household/household-like cluster, and if so ensure that clearance antibiotics are provided to as outlined in the section [Contact management](#).

#### *Case treatment*

Clinical management of the case is the responsibility of the treating doctor. Refer to the current edition of [Therapeutic Guidelines: Antibiotic](#) for treatment guidelines.

### ***Isolation and restriction***

The case is generally considered infectious from the onset of the acute illness until completion of 24 hours treatment with effective systemic antibiotics.[1] During this period the case should be managed using droplet precautions.

## **10. Control of environment**

### **Routine**

No routine control activities.

For management of iGAS in Aboriginal communities, refer to [Section 12](#).

## **11. Contact management**

### **Contact tracing**

Management of cases and household or house-hold like contacts is the responsibility of the treating clinician. Guidelines for the management of cases and household or household-like contacts can be found in the [Therapeutic Guidelines: Antibiotic](#).

Public health units are not required to undertake routine screening and arrange clearance antibiotics for iGAS contacts in NSW, except for:

- where either the mother or neonate develops iGAS during the first 28 days after birth,
- household or household-like clusters ([see Special situations](#)), or
- institutional outbreaks ([see Special situations](#)).

### **Household or household-like contact definition**

People who lived in the same house (or dormitory-type room) or were having an equivalent degree of contact with the case in the 7 days prior to the onset of the case's symptoms until completion of 24 hours of appropriate antibiotic treatment.

### **Maternal-neonate pairs**

Routine contact tracing is recommended if the case is either a mother or neonate in the first 28 days after birth.

If either a mother or baby develops iGAS in the first 28 days after birth, antibiotics should be offered to the other of the pair, and any other neonate(s) in the case of a multiple birth. Antibiotics should be started as soon as possible.

#### ***Management***

- Advise the treating clinician of the recommended public health management for the contact.
- Provide the mother with a copy of the iGAS factsheet.

## Other contact tracing

Routine screening and clearance antibiotics are not recommended for household and other close contacts (unless in the event of a cluster or outbreak). Household or household-like contacts should be provided with a factsheet by the treating clinician. Symptomatic close contacts should be referred for clinical assessment.

### **Restriction**

No restriction is required for asymptomatic contacts.

## Clearance antibiotics

When clearance antibiotics are indicated, the current edition of [Therapeutic Guidelines: Antibiotic](#) recommend starting as soon as possible as secondary cases usually occur shortly after the index case. Suitable regimens are shown in Table 1.

**Table 1: Suitable antibiotic regimens for iGAS contacts**

Antibiotic	Dose	Indications
benzathine benzylpenicillin intramuscularly, as a single dose <sup>1</sup>	<ul style="list-style-type: none"><li>adult or child 20 kg or more: 1.2 million units (2.3 mL)</li><li>neonate and child 6 kg or less: 0.3 million units (0.6 mL)</li><li>child 6 kg to less than 12 kg: 0.45 million units (0.9 mL)</li><li>child 12 kg to less than 16 kg: 0.6 million units (1.2 mL)</li><li>child 16 kg to less than 20 kg: 0.9 million units (1.7 mL)</li></ul>	No hypersensitivity to penicillins
cefalexin orally, 12-hourly for 10 days <sup>2</sup>	<ul style="list-style-type: none"><li>adult 1g</li><li>neonate and child 25 mg/kg up to 1g</li></ul>	No hypersensitivity to penicillins OR Delayed non-severe hypersensitivity to penicillins
azithromycin orally, daily for 5 days	<ul style="list-style-type: none"><li>adult 500mg</li><li>child 12 mg/kg up to 500mg</li></ul>	Immediate (non-severe or severe) or delayed severe hypersensitivity to penicillin

1. Benzathine benzylpenicillin, which is long acting, should not be confused with benzyl penicillin, which is short acting.
2. It is safe to use cefalexin in patients who had a delayed non-severe reaction to a penicillin in the distant past. It is also safe to use cefalexin in patients who have had a delayed non-severe reaction recently, unless the reaction involved amoxicillin or ampicillin, because cross-reactivity between these drugs is possible. For patients who have had a recent delayed non-severe reaction to amoxicillin or ampicillin, use



the drug recommended for patients with immediate (non-severe or severe) or delayed severe hypersensitivity.

## 12. Special situations

### Household clusters

#### **Definition**

Two or more cases of iGAS epidemiologically linked in household or household-like contacts within a 30-day period.

#### **Management**

All household and household-like contacts should be issued clearance antibiotics (refer to Table 1 above) and be provided with the iGAS fact sheet. Where a secondary case is identified after the primary case has completed a course of antibiotics, the primary case does not require clearance antibiotics.

For Aboriginal people, decisions around management of disease and contact tracing should be made in collaboration with the family, or family champion, for a tailored and individual response that is realistic and achievable for the family/household.

Specimens from suspected clusters should be sent to ICPMR for molecular typing. The administration of clearance antibiotics should not be delayed while waiting for molecular typing results.

### Institutional outbreaks

#### **Definition**

**Confirmed iGAS outbreak** - 2 or more cases of iGAS that are epidemiologically linked (particularly aged care, childcare, hospitals or maternity wards) that occur within a 30-day period and are identical on molecular typing.

**Suspected iGAS outbreak** - 2 or more cases of iGAS that are epidemiologically linked (particularly aged care, childcare, hospitals or maternity wards) that occur within a 30-day period.

An epidemiological link exists where cases occur in a physical or geographical context and a plausible mode of transmission accounts for infection spreading between people, AND when one person is likely to have been infectious AND at least one person has an illness which starts within the incubation period after contact with an infectious person.

Where 2 or more iGAS cases occur in an institution within a 3-month period, consideration should be given as to whether there is an ongoing outbreak with transmission from asymptomatic carriage and/or non-invasive Strep A infection.

#### **Management**

On suspicion of an outbreak, the PHU should:

- Liaise with the institution's management to inform all institutional contacts of the increased risk of iGAS in the next 30 days and provide them with a factsheet.
- Arrange for specimens to be sent to ICPMR for molecular typing.

Where an outbreak is confirmed or there is clear epidemiological evidence of transmission in the absence of molecular typing, all asymptomatic residents and staff should be offered clearance antibiotics simultaneously (refer to Table 1 above). In the situation where the iGAS cases occur within a subdivision of the facility and there is negligible crossover of residents and patient-care staff between subdivisions, clearance antibiotics can be restricted to those within the affected subdivision.

### **Restriction**

Restriction is generally not required for asymptomatic contacts.

## **Response in Aboriginal communities**

Aboriginal people are considered a priority group for preventing Strep A infections and their sequelae (including iGAS) due to key drivers for increased transmission, including community burden of disease, high number of people in the household and inadequate housing, and barriers to accessing healthcare including institutional racism and mistrust of mainstream health services.

NSW Health is committed to working in partnership with Aboriginal people and communities to improve the health outcomes of Aboriginal people as outlined in documents such as:

- [NSW Aboriginal Health Plan 2013-2023](#);
- [NSW Aboriginal Health Partnership Agreement 2015 – 2025](#);
- [NSW Implementation Plan for Closing the Gap](#).

### **Working with Aboriginal people and communities**

Consider referring household and household-like contacts to their Aboriginal Community Controlled Health Service/Aboriginal Medical Service or local health providers for ongoing assessment and follow up if iGAS symptoms develop for culturally appropriate follow-up.

Environmental health and health education programs should be planned, developed, implemented and disseminated with Aboriginal peoples within a culturally appropriate governance structure, where Aboriginal people actively participate in decisions about public health strategies and actions. Local Aboriginal Health Workers and the local Aboriginal Community Controlled Health Organisations are key stakeholders and should be included in the development of public health plans and responses.

### **Community outbreaks**

Outbreaks, or increases in rates of iGAS in Aboriginal communities should have a considered response, considering the risk mitigation strategies below. Discussions regarding education, health promotion and prevention programs, and prioritisation of future Housing for Health projects should include PHU environmental health officers. For suggestions on specific risk mitigation activities [refer to section 3](#).

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